

In-Circuit Emulator for MC68020/30

- 33 MHz no-waitstate emulation
- MMU support
- FPU support
- Support for companion mode MC68360
- Interface with all compilers
- C++ support
- CASE tools interface
- RTOS support
- Windows9x, NT and Motif interface

MC68020

MC68030

MC68EC020

MC68EC030

The ICE68020 emulator module supports the MC68020 and MC68030 processors from Freescale. The EC versions are supported as well.

The software has direct access to MMU and FPU functions.

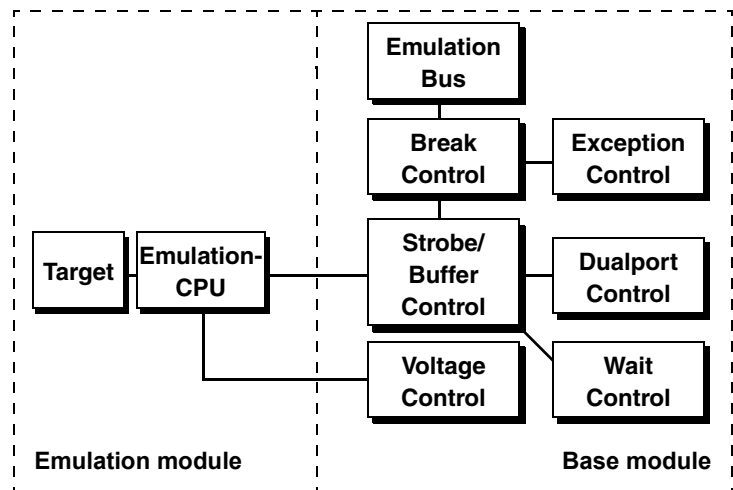
A software compatible ROM monitor is available.

TRACE32-ICE is a state of the art In-Circuit Emulator, which offers unlimited hardware breakpoints and up to 16MByte dual-ported emulation memory. The real-time trace and trigger work up to the max. speed of the CPU. The analyzer offers selective trace as well as performance analysis and statistic functions.

TRACE32 works with the highest variety of host interfaces. The communication link to the host is done by the printer port, a fibre optic interface or ethernet allowing a high-speed transfer.

Features

Basics of Operation



The ICE-68020 is a high-performance emulation system for all 68020 and 68030 derivatives from Motorola.

Operating Modes

The Emulator can work in stand-alone mode with internal clock or in active mode with internal or the target clock. On power-down of the target system the emulator tristates its output buffers and isolates its internal emulation circuits.

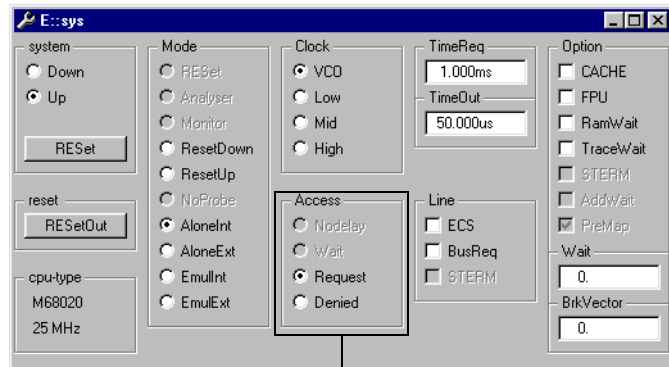
- Reset Down
- Reset Up
- No Probe
- Alone Internal
- Alone External
- Emulation Internal
- Emulation External

Wait System

- Additional wait cycles (1-15) can be specified
- Up to 250 wait cycles (4K blocks globally and bitwise in 64K area)

Voltage and Clock Monitors for the Target System

Dual-Port Access



Dual port access modes

All TRACE32 memories are dual-ported. The dual-port access makes it possible to display and modify the contents of the overlay memory, to set or delete breakpoints or use the flag memory while the application is running in real-time.

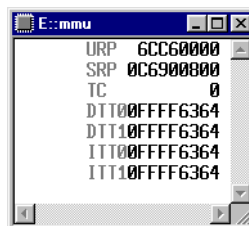
The following dual-port access mode is implemented:

- Request

In the **Request mode** the dual port access is always possible.

In the **Denied mode** the dual port access is switched off.

MMU Support



- Display of Register
- Display of translation tables
- Debugging with logical addresses
- Separate logical memory spaces for multitask environments

Emulation does not use any Memory

- No target stack required

Cache Support

ICE-68020 supports cache operations for the target memory.

HLL Debugging

The screenshot shows the TRACE32 debugger window with the following assembly code and a context menu:

Step	Step Over	Go Next	Go Return	Go Up	Go	Break	Mode		
addr/line	code	label	mnemonic						comment
555	{								
SP:00001788	48E73830	sieve:	moven.l	[d2-d4,a2-a3],-	(a7)				
SP:0000178C	227C0000		movea.l	#2774,a1				; #flags,a1	
								register int i, prime, k;	
								int count;	
559								count = 0;	
SP:00001792	7200		moveq	#0,d1				; #0,count	
561								for (i = 0 ; i <= SIZE ; flag	
SP:00001794	7400		moveq	#0					
SP:00001796	2042		movea.l	d2					
SP:00001798	5282		addq.l	#1					
SP:0000179A	13BC0000	18800	move.b	#1				a1,a0.l*1)	
SP:000017A0	7012		moveq	#1;					
SP:000017A2	B082		cmp.l	d2					
SP:000017A4	6CF0		bge	17!				other...	

The TRACE32 debugger provides a interface to C, C++, PASCAL, PEARL and ADA for all standard compilers. For more information on the supported compilers refer to the section "Debug Interfaces".

Full support in real-time for:

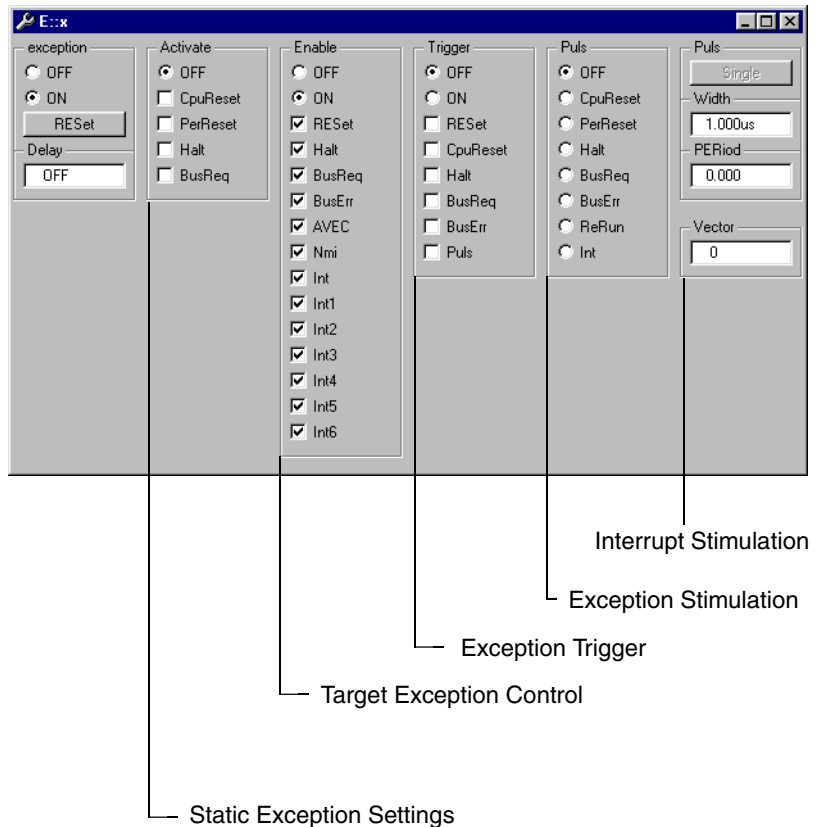
- Break-before-line operation
- HLL single step in real-time
- Trigger and trace on local variables

Background Task

The background task allows:

- To process interrupts
- To maintain the refresh of a target DRAM while the emulation is stopped.

Exception Control



The TRACE32 exception controller allows to permanently activate an exception, to enable or disable specific exceptions, to trigger on specific exceptions or to stimulate an exception.

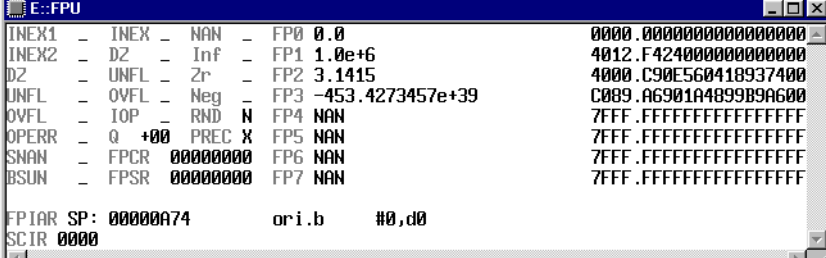
- Interrupt Stimulation
 - Level-1...7-interrupts
 - All vectors

TRAPs used for Emulation

Program breakpoints are installed by a BPT instruction. ICE-68040 offers free selection of the breakpoint vector to avoid conflicts with other applications.

- BPT0,2,4,7 selectable

FPU Support



```

E::FPU
INEX1 - INEX - NAN - FP0 0.0          0000.0000000000000000
INEX2 - DZ - Inf - FP1 1.0e+6        4012.F424000000000000
DZ - UNFL - Zr - FP2 3.1415         4000.C90E560418937400
UNFL - OVFL - Neg - FP3 -453.4273457e+39  C089.A6901A4899B9A600
OVFL - IOP - RND N FP4 NAN          7FFF.FFFFFFFFFFFFFFFF
OPERR - Q +00 PREC X FP5 NAN        7FFF.FFFFFFFFFFFFFFFF
SNAN - FPCR 00000000 FP6 NAN        7FFF.FFFFFFFFFFFFFFFF
BSUN - FPSR 00000000 FP7 NAN        7FFF.FFFFFFFFFFFFFFFF

FPIAR SP: 00000A74      ori.b      #0,d0
SCIR 0000
  
```

The display and the modification of the FPU registers is supported.

32 Additional Trace Channels

- 16 Bit Date 4 Bit State
- 12 Bit Address

Limitations

- No Burst Mode (68030)

Emulation Modules

Modules Overview

tbd

Debug Interfaces

TRACE32-PowerView supports most compilers, realtime operation systems and debuggers.

New integrations are mostly done on customers request. If your compiler or RTOS is not supported now, please ask us !

Compiler Support

CPU	Language	Compier	Compan y	Option
68K	ADA	ALSYS-ADA		IEEE
68K	ADA	TELESOFT-ADA	Telesoft	IEEE
68K	ASM	RTOS	IEP GmbH	SYM/LOC
68K	ASM	ASM68K	Mentor Graphics Corporation	IEEE
68K	ASM	VERSADOS-ASM	NXP Semicon ductors	VERSADOS
68K	ASM	OS-9-ASSEMBLER	Radisys Inc.	ROF
68K	ASM	AS68	TASKING	IEEE
68K	C	HP-64000-C		HP
68K	C	ORGANON	CAD-UL Electronics Service s GmbH	BOUND
68K	C	C68K	Cosmic Software	COSMIC
68K	C	GNU-C	Free Software Foundati on, Inc.	ELF/DWARF
68K	C	GNU-C	Free Software Foundati on, Inc.	COFF
68K	C	GNU-C	Free Software Foundati on, Inc.	ELF/DWARF

CPU	Language	Compiers	Company	Option
68K	C	GREEN-HILLS-C	Greenhills Software Inc.	COFF
68K	C	ICC68K	Introl Corporation	ICOFF
68K	C	MCC	Mentor Graphics Corporation	IEEE
68K	C	HT-68K	Microchip Technology Inc.	HITECH
68K	C	HICROSS-68K	NXP Semiconductors	HICROSS
68K	C	CC68K	NXP Semiconductors	COFF
68K	C	ULTRA-C	Radisys Inc.	ROF
68K	C	OS/9-C	Radisys Inc.	ROF
68K	C	CROSSCODE-C	SDSI	SDS
68K	C	SCC68K	Sierra	COFF
68K	C	SUN3-CC	Oracle Corporation	DBX
68K	C	ICC68K	TASKING	COFF
68K	C	ICC68K	TASKING	IEEE
68K	C	TT-68K	TASKING	IEEE
68K	C	TCC68K	TASKING	AOUT
68K	C	TEKTRONIX-C	Tektronix	COMFOR
68K	C	D-CC	Wind River Systems	IEEE
68K	C	D-CC	Wind River Systems	ELF/DWARF

CPU	Language	Compiler	Company	Option
68K	C++	ORGANON-C++	CAD-UL Electronic Services GmbH	BOUND
68K	C++	GNU-C++	Free Software Foundati on, Inc.	DBX
68K	C++	GNU-C++	Free Software Foundati on, Inc.	ELF/DWARF
68K	C++	CCC68K	Mentor Graphics Corporati on	IEEE
68K	C++	HICROSS- 68K	NXP Semicon ductors	HICROSS
68K	C++	CODEWAR RIOR	NXP Semicon ductors	ELF/DWARF
68K	C++	CROSSCO DE-C++	SDSI	SDS
68K	C++	D-C++	Wind River Systems	ELF/DWARF
68K	MODULA	MOD68K	Introl Corporati on	ICOFF
68K	MODULA	MCS2	Multicha nnelsyst ems GmbH	COFF
68K	MODULA	MCDS	NXP Semicon ductors	MCDS
68K	PASCAL	MPC	Mentor Graphics Corporati on	IEEE
68K	PEARL	RTOS	IEP GmbH	SYM/LOC

RTOS Support

Company	Product	Comment
Atego Ltd.	AdaWorld ARTK	
KadakProducts Ltd.	AMX	
Oracle Corporation	ChorusOS	
CMX Systems Inc.	CMX-RTX	
Synopsys, Inc	MQX	2.40 and 2.50, 3.6
	MTOS-UX	
Mentor Graphics Corporation	Nucleus PLUS	
Radisys Inc.	OS-9	
Enea OSE Systems	OSE Classic	(OS68)
Enea OSE Systems	OSE Delta	4.x and 5.x
	RealTime Craft	(XEC68k)
Quadros Systems Inc.	RTXC 3.2	
IBM Corp.	SDT-Cmicro	
-	uCLinux	Kernel Version 2.4 and 2.6, 3.x
Mentor Graphics Corporation	VRTX32	
Mentor Graphics Corporation	VRTXmc	
Mentor Graphics Corporation	VRTXsa	
Wind River Systems	VxWorks	5.x and 6.x

Debugger Support

CPU	Debugger	Company
	WINDOWS CE PLATF. BUILDER	-
	CODE::BLOC KS	-
	C++TEST	-
	ADENEO	-
	X-TOOLS / X32	blue river software GmbH
	CODEWRIGH T	Borland Software Corporation
	CODE CONFIDENC E TOOLS	Code Confidence Ltd
	CODE CONFIDENC E TOOLS	Code Confidence Ltd
	EASYCODE	EASYCODE GmbH
	ECLIPSE	Eclipse Foundation, Inc
	CHRONVIEW	Inchron GmbH
	LDRA TOOL SUITE	LDRA Technology, Inc.
	UML DEBUGGER	LieberLieber Software GmbH
	SIMULINK	The MathWorks Inc.
	ATTOL TOOLS	MicroMax Inc.
	VISUAL BASIC INTERFACE	Microsoft Corporation
	LABVIEW	NATIONAL INSTRUMENT S Corporation
	RAPITIME	Rapita Systems Ltd.
	RHAPSODY IN MICROC	IBM Corp.

CPU	Debugger	Company
	RHAPSODY IN C++	IBM Corp.
	DA-C	RistanCASE
	TRACEANALY ZER	Symtavigation GmbH
	TA INSPECTOR	Timing Architects GmbH
	UNDODB	Undo Software
	VECTORCAS T UNIT TESTING	Vector Software
	VECTORCAS T CODE COVERAGE	Vector Software
68K	OS68 DEBUGGER	Enea OSE Systems
68K	SDT CMICRO	IBM Corp.
68K	DIAB RTA SUITE	Wind River Systems

Operation Voltage and Frequency

The maximum operation frequency of TRACE32-ICE depends on:

- The max. frequency of the CPU
- The access time of the overlay memory (15ns or 35ns)
- The mapper mode (**Slow** or **Fast**)
- The number of waitstates (W0 = 0 waitstates
W1 = 1 waitstate)
- The dual-port access mode

Denied and Request Access

Operating Voltage

This list contains information on probes available for other voltage ranges.

Probes not noted here supply an operation voltage range from 4.5V to 5.5V. tbd

Dimensions

Module Dimensions

tbd

Available Tool Chain

TRACE32 provides a complete set of development tools for this family. This includes:

- The In-Circuit Emulator TRACE32-ICE
- The high speed RISC Emulator TRACE32-FIRE
- The BDM/JTAG/ONCE etc. based In-Circuit Debugger TRACE32-ICD
- The ROM Monitor based In-Circuit Debugger TRACE32-ICD
- The ICD Trace, a trace extension to the BDM/JTAG debuggers or ROM monitors
- Evaluation boards, which can be used until the target hardware is available.
- The Instruction Set Simulator (SIM), a software tool for code test without any hardware

The following list give an overview which development tools are available for the specific derivatives of this family.

tbd

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Module Description

Detailed Order Information

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